Key Terms

archival research method of research using past records or data sets to answer various research questions, or to search for interesting patterns or relationships

attrition reduction in number of research participants as some drop out of the study over time

cause-and-effect relationship changes in one variable cause the changes in the other variable; can be determined only through an experimental research design

clinical or case study observational research study focusing on one or a few people

confirmation bias tendency to ignore evidence that disproves ideas or beliefs

confounding variable unanticipated outside factor that affects both variables of interest, often giving the false impression that changes in one variable causes changes in the other variable, when, in actuality, the outside factor causes changes in both variables

control group serves as a basis for comparison and controls for chance factors that might influence the results of the study—by holding such factors constant across groups so that the experimental manipulation is the only difference between groups

correlation coefficient number from -1 to +1, indicating the strength and direction of the relationship between variables, and usually represented by *r*

correlation relationship between two or more variables; when two variables are correlated, one variable changes as the other does

cross-sectional research compares multiple segments of a population at a single time

debriefing when an experiment involved deception, participants are told complete and truthful information about the experiment at its conclusion

deception purposely misleading experiment participants in order to maintain the integrity of the experiment

deductive reasoning results are predicted based on a general premise

dependent variable variable that the researcher measures to see how much effect the independent variable had

double-blind study experiment in which both the researchers and the participants are blind to group assignments

empirical grounded in objective, tangible evidence that can be observed time and time again, regardless of who is observing

experimental group group designed to answer the research question; experimental manipulation is the only difference between the experimental and control groups, so any differences between the two are due to experimental manipulation rather than chance

experimenter bias researcher expectations skew the results of the study

fact objective and verifiable observation, established using evidence collected through empirical research

falsifiable able to be disproven by experimental results

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generalize inferring that the results for a sample apply to the larger population

hypothesis (plural: hypotheses) tentative and testable statement about the relationship between two or more variables

Institutional Animal Care and Use Committee (IACUC) committee of administrators, scientists, veterinarians, and community members that reviews proposals for research involving human participants

Institutional Review Board (IRB) committee of administrators, scientists, and community members that reviews proposals for research involving human participants

illusory correlation seeing relationships between two things when in reality no such relationship exists

independent variable variable that is influenced or controlled by the experimenter; in a sound experimental study, the independent variable is the only important difference between the experimental and control group

inductive reasoning conclusions are drawn from observations

informed consent process of informing a research participant about what to expect during an experiment, any risks involved, and the implications of the research, and then obtaining the person's consent to participate

inter-rater reliability measure of agreement among observers on how they record and classify a particular event

longitudinal research studies in which the same group of individuals is surveyed or measured repeatedly over an extended period of time

naturalistic observation observation of behavior in its natural setting

negative correlation two variables change in different directions, with one becoming larger as the other becomes smaller; a negative correlation is not the same thing as no correlation

observer bias when observations may be skewed to align with observer expectations

operational definition description of what actions and operations will be used to measure the dependent variables and manipulate the independent variables

opinion personal judgments, conclusions, or attitudes that may or may not be accurate

participants subjects of psychological research

peer-reviewed journal article article read by several other scientists (usually anonymously) with expertise in the subject matter, who provide feedback regarding the quality of the manuscript before it is accepted for publication

placebo effect people's expectations or beliefs influencing or determining their experience in a given situation

population overall group of individuals that the researchers are interested in

positive correlation two variables change in the same direction, both becoming either larger or smaller

random assignment method of experimental group assignment in which all participants have an equal chance of being assigned to either group

random sample subset of a larger population in which every member of the population has an equal chance of being selected

reliability consistency and reproducibility of a given result

replicate repeating an experiment using different samples to determine the research's reliability

sample subset of individuals selected from the larger population

single-blind study experiment in which the researcher knows which participants are in the experimental group and which are in the control group

statistical analysis determines how likely any difference between experimental groups is due to chance

survey list of questions to be answered by research participants—given as paper-and-pencil questionnaires, administered electronically, or conducted verbally—allowing researchers to collect data from a large number of people

theory well-developed set of ideas that propose an explanation for observed phenomena

validity accuracy of a given result in measuring what it is designed to measure

Summary

2.1 Why Is Research Important?
Scientists are engaged in explaining and understanding how the world around them works, and they are able to do so by coming up with theories that generate hypotheses that are testable and falsifiable. Theories that stand up to their tests are retained and refined, while those that do not are discarded or modified. In this way, research enables scientists to separate fact from simple opinion. Having good information generated from research aids in making wise decisions both in public policy and in our personal lives.

2.2 Approaches to Research
The clinical or case study involves studying just a few individuals for an extended period of time. While this approach provides an incredible depth of information, the ability to generalize these observations to the larger population is problematic. Naturalistic observation involves observing behavior in a natural setting and allows for the collection of valid, true-to-life information from realistic situations. However, naturalistic observation does not allow for much control and often requires quite a bit of time and money to perform. Researchers strive to ensure that their tools for collecting data are both reliable (consistent and replicable) and valid (accurate).

Surveys can be administered in a number of ways and make it possible to collect large amounts of data quickly. However, the depth of information that can be collected through surveys is somewhat limited compared to a clinical or case study.

Archival research involves studying existing data sets to answer research questions.

Longitudinal research has been incredibly helpful to researchers who need to collect data on how people change over time. Cross-sectional research compares multiple segments of a population at a single time.

2.3 Analyzing Findings
A correlation is described with a correlation coefficient, *r*, which ranges from -1 to 1. The correlation coefficient tells us about the nature (positive or negative) and the strength of the relationship between two or more variables. Correlations do not tell us anything about causation—regardless of how strong the relationship is between variables. In fact, the only way to demonstrate causation is by conducting an experiment. People often make the mistake of claiming that correlations exist when they really do not.

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Researchers can test cause-and-effect hypotheses by conducting experiments. Ideally, experimental participants are randomly selected from the population of interest. Then, the participants are randomly assigned to their respective groups. Sometimes, the researcher and the participants are blind to group membership to prevent their expectations from influencing the results.

In ideal experimental design, the only difference between the experimental and control groups is whether participants are exposed to the experimental manipulation. Each group goes through all phases of the experiment, but each group will experience a different level of the independent variable: the experimental group is exposed to the experimental manipulation, and the control group is not exposed to the experimental manipulation. The researcher then measures the changes that are produced in the dependent variable in each group. Once data is collected from both groups, it is analyzed statistically to determine if there are meaningful differences between the groups.

Psychologists report their research findings in peer-reviewed journal articles. Research published in this format is checked by several other psychologists who serve as a filter separating ideas that are supported by evidence from ideas that are not. Replication has an important role in ensuring the legitimacy of published research. In the long run, only those findings that are capable of being replicated consistently will achieve consensus in the scientific community.

2.4 Ethics

Ethics in research is an evolving field, and some practices that were accepted or tolerated in the past would be considered unethical today. Researchers are expected to adhere to basic ethical guidelines when conducting experiments that involve human participants. Any experiment involving human participants must be approved by an IRB. Participation in experiments is voluntary and requires informed consent of the participants. If any deception is involved in the experiment, each participant must be fully debriefed upon the conclusion of the study.

Animal research is also held to a high ethical standard. Researchers who use animals as experimental subjects must design their projects so that pain and distress are minimized. Animal research requires the approval of an IACUC, and all animal facilities are subject to regular inspections to ensure that animals are being treated humanely.

Review Questions

1. Scientific hypotheses are _____ and falsifiable.
- a. observable
- b. original
- c. provable
- d. testable

2. _____ are defined as observable realities.
- a. behaviors
- b. facts
- c. opinions
- d. theories

3. Scientific knowledge is _____.
- a. intuitive
- b. empirical
- c. permanent
- d. subjective

4. A major criticism of Freud's early theories involves the fact that his theories _____.
- a. were too limited in scope
- b. were too outrageous
- c. were too broad
- d. were not testable

5. Sigmund Freud developed his theory of human personality by conducting in-depth interviews over an extended period of time with a few clients. This type of research approach is known as a(n): _____.
- a. archival research
- b. case study
- c. naturalistic observation
- d. survey

6. _____ involves observing behavior in individuals in their natural environments.

a. archival research
b. case study
c. naturalistic observation
d. survey

7. The major limitation of case studies is _____.

a. the superficial nature of the information collected in this approach
b. the lack of control that the researcher has in this approach
c. the inability to generalize the findings from this approach to the larger population
d. the absence of inter-rater reliability

8. The benefit of naturalistic observation studies is _____.

a. the honesty of the data that is collected in a realistic setting
b. how quick and easy these studies are to perform
c. the researcher's capacity to make sure that data is collected as efficiently as possible
d. the ability to determine cause and effect in this particular approach

9. Using existing records to try to answer a research question is known as _____.

a. naturalistic observation
b. survey research
c. longitudinal research
d. archival research

10. _____ involves following a group of research participants for an extended period of time.

a. archival research
b. longitudinal research
c. naturalistic observation
d. cross-sectional research

11. A(n) _____ is a list of questions developed by a researcher that can be administered in paper form.

a. archive
b. case Study
c. naturalistic observation
d. survey

12. Longitudinal research is complicated by high rates of _____.

a. deception
b. observation
c. attrition
d. generalization

13. Height and weight are positively correlated. This means that as height _____ weight _____.

a. increases; increases
b. decreases; decreases
c. increases; decreases
d. decreases; increases

14. Which of the following correlation coefficients indicates the strongest relationship between two variables?

a. -.90
b. -.50
c. +.80
d. +.25

15. Which statement best illustrates a negative correlation between the number of hours spent watching TV the week before an exam and the grade on that exam?

a. Watching too much television leads to poor exam performance.
b. Smart students watch less television.
c. Viewing television interferes with a student's ability to prepare for the upcoming exam.
d. Students who watch more television perform more poorly on their exams.

16. The correlation coefficient indicates the weakest relationship when _____.

a. it is closest to 0
b. it is closest to -1
c. it is positive
d. it is negative

17. _____ means that everyone in the population has the same likelihood of being asked to participate in the study.

a. operationalizing
b. placebo effect
c. random assignment
d. random sampling

18. The _____ is controlled by the experimenter, while the _____ represents the

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information collected and statistically analyzed by the experimenter.

a. dependent variable; independent variable
b. independent variable; dependent variable
c. placebo effect; experimenter bias
d. experiment bias; placebo effect

19. Researchers must _____ important concepts in their studies so others would have a clear understanding of exactly how those concepts were defined.

a. randomly assign
b. randomly select
c. operationalize
d. generalize

20. Sometimes, researchers will administer a(n) _____ to participants in the control group to control for the effects that participant expectation might have on the experiment.

a. dependent variable
b. independent variable
c. statistical analysis
d. placebo

21. _____ is to animal research as _____ is to human research.

a. informed consent; deception
b. IACUC; IRB
c. IRB; IACUC
d. deception; debriefing

22. Researchers might use _____ when providing participants with the full details of the experiment could skew their responses.

a. informed consent
b. deception
c. ethics
d. debriefing

23. A person's participation in a research project must be _____.

a. confidential
b. rewarded
c. voluntary
d. public

24. Before participating in an experiment, individuals should read and sign the _____ form.

a. informed consent
b. debriefing
c. IRB
d. ethics

Critical Thinking Questions

25. In this section, the D.A.R.E. program was described as an incredibly popular program in schools across the United States despite the fact that research consistently suggests that this program is largely ineffective. How might one explain this discrepancy?

26. The scientific method is often described as self-correcting and cyclical. Briefly describe your understanding of the scientific method with regard to these concepts.

27. In this section, conjoined twins, Krista and Tatiana, were described as being potential participants in a case study. In what other circumstances would you think that this particular research approach would be especially helpful and why?

28. Presumably, reality television programs aim to provide a realistic portrayal of the behavior displayed by the characters featured in such programs. This section pointed out why this is not really the case. What changes could be made in the way that these programs are produced that would result in more honest portrayals of realistic behavior?

29. Which of the research methods discussed in this section would be best suited to research the effectiveness of the D.A.R.E. program in preventing the use of alcohol and other drugs? Why?

30. Aside from biomedical research, what other areas of research could greatly benefit by both longitudinal and archival research?

31. Earlier in this section, we read about research suggesting that there is a correlation between eating cereal and weight. Cereal companies that present this information in their advertisements could lead someone to believe that eating more cereal causes healthy weight. Why would they make such a claim and what arguments could you make to counter this cause-and-effect claim?

32. Recently a study was published in the journal, *Nutrition and Cancer*, which established a negative correlation between coffee consumption and breast cancer. Specifically, it was found that women consuming more than 5 cups of coffee a day were less likely to develop breast cancer than women who never consumed coffee (Lowcock, Cotterchio, Anderson, Boucher, & El-Sohemy, 2013). Imagine you see a newspaper story about this research that says, "Coffee Protects Against Cancer." Why is this headline misleading and why would a more accurate headline draw less interest?

33. Sometimes, true random sampling can be very difficult to obtain. Many researchers make use of convenience samples as an alternative. For example, one popular convenience sample would involve students enrolled in Introduction to Psychology courses. What are the implications of using this sampling technique?

34. Peer review is an important part of publishing research findings in many scientific disciplines. This process is normally conducted anonymously; in other words, the author of the article being reviewed does not know who is reviewing the article, and the reviewers are unaware of the author's identity. Why would this be an important part of this process?

35. Some argue that animal research is inherently flawed in terms of being ethical because unlike human participants, animals do not consent to be involved in research. Do you agree with this perspective? Given that animals do not consent to be involved in research projects, what sorts of extra precautions should be taken to ensure that they receive the most humane treatment possible?

36. At the end of the last section, you were asked to design a basic experiment to answer some question of interest. What ethical considerations should be made with the study you proposed to ensure that your experiment would conform to the scientific community's expectations of ethical research?

Personal Application Questions

37. Healthcare professionals cite an enormous number of health problems related to obesity, and many people have an understandable desire to attain a healthy weight. There are many diet programs, services, and products on the market to aid those who wish to lose weight. If a close friend was considering purchasing or participating in one of these products, programs, or services, how would you make sure your friend was fully aware of the potential consequences of this decision? What sort of information would you want to review before making such an investment or lifestyle change yourself?

38. A friend of yours is working part-time in a local pet store. Your friend has become increasingly interested in how dogs normally communicate and interact with each other, and is thinking of visiting a local veterinary clinic to see how dogs interact in the waiting room. After reading this section, do you think this is the best way to better understand such interactions? Do you have any suggestions that might result in more valid data?

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39. As a college student, you are no doubt concerned about the grades that you earn while completing your coursework. If you wanted to know how overall GPA is related to success in life after college, how would you choose to approach this question and what kind of resources would you need to conduct this research?

40. We all have a tendency to make illusory correlations from time to time. Try to think of an illusory correlation that is held by you, a family member, or a close friend. How do you think this illusory correlation came about and what can be done in the future to combat them?

41. Are there any questions about human or animal behavior that you would really like to answer? Generate a hypothesis and briefly describe how you would conduct an experiment to answer your question.

42. Take a few minutes to think about all of the advancements that our society has achieved as a function of research involving animal subjects. How have you, a friend, or a family member benefited directly from this kind of research?

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